



U.S. DEPARTMENT OF  
**ENERGY**

Savannah River Site

**A Presentation to the  
Savannah River Site  
Citizens Advisory Board**

# **Chemicals, Metals, and Pesticides (CMP) Pits Electrical Resistance Heating (ERH) System**

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## Purpose

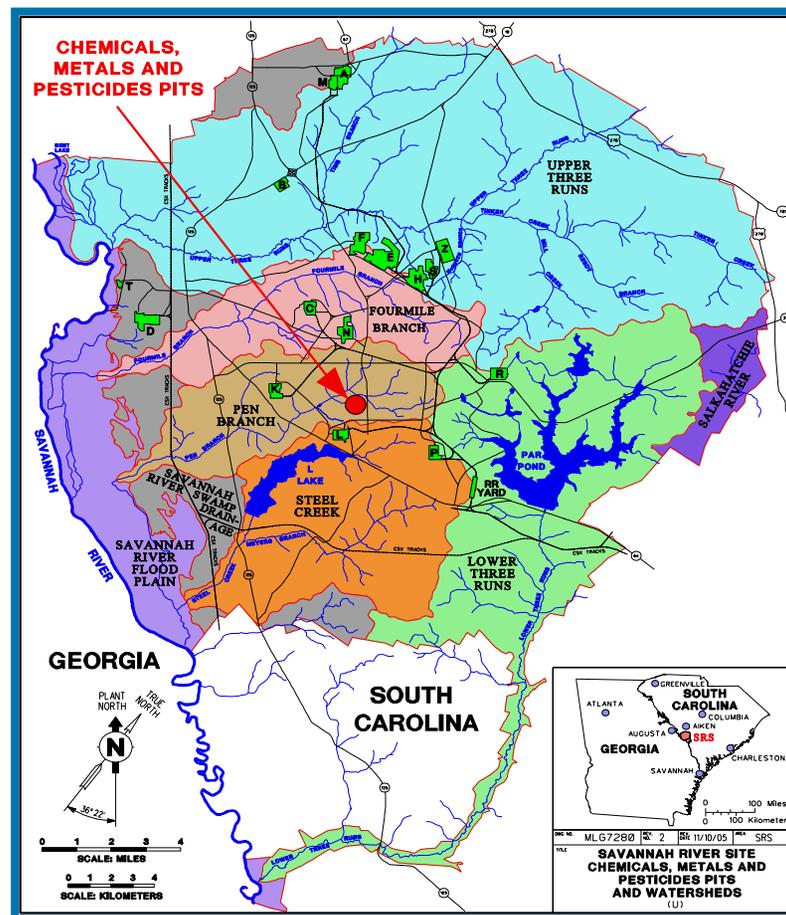
- **To provide the Facilities Disposition and Site Remediation Committee an update and the results of the Electrical Resistance Heating / Soil Vapor Extraction at the Chemical, Metals, and Pesticides Pits**
  - **Funding: Recovery Act Funded Since April 2009**
  - **Total ERH Project Costs: \$4.2 million**

# Acronyms

- **bls**                      **Below Land Surface**
- **CERCLA**                **Comprehensive Environmental Compensation and Liability Act**
- **CMP**                     **Chemicals Metals and Pesticides**
- **COCs**                   **Contaminations of Concern**
- **DCM**                    **Dichloromethane**
- **DNAPL**                 **Dense Non-Aqueous Phase Liquid**
- **ERH**                    **Electrical Resistance Heating**
- **mg / kg**                **Milligram / Kilogram**
- **MNA**                   **Monitored Natural Attenuation**
- **MSL**                    **Mean Sea Level**
- **PCB**                    **Polychlorinated Biphenyl**
- **PCE**                    **Tetrachloroethylene**
- **RCRA**                 **Resource Conservation and Recovery Act**
- **RG**                     **Remedial Goal**
- **SRS**                    **Savannah River Site**
- **SVE**                    **Soil Vapor Extraction**
- **SVEU**                 **Soil Vapor Extraction Unit**
- **TCE**                    **Trichloroethylene**
- **VOCs**                 **Volatile Organic Compounds**

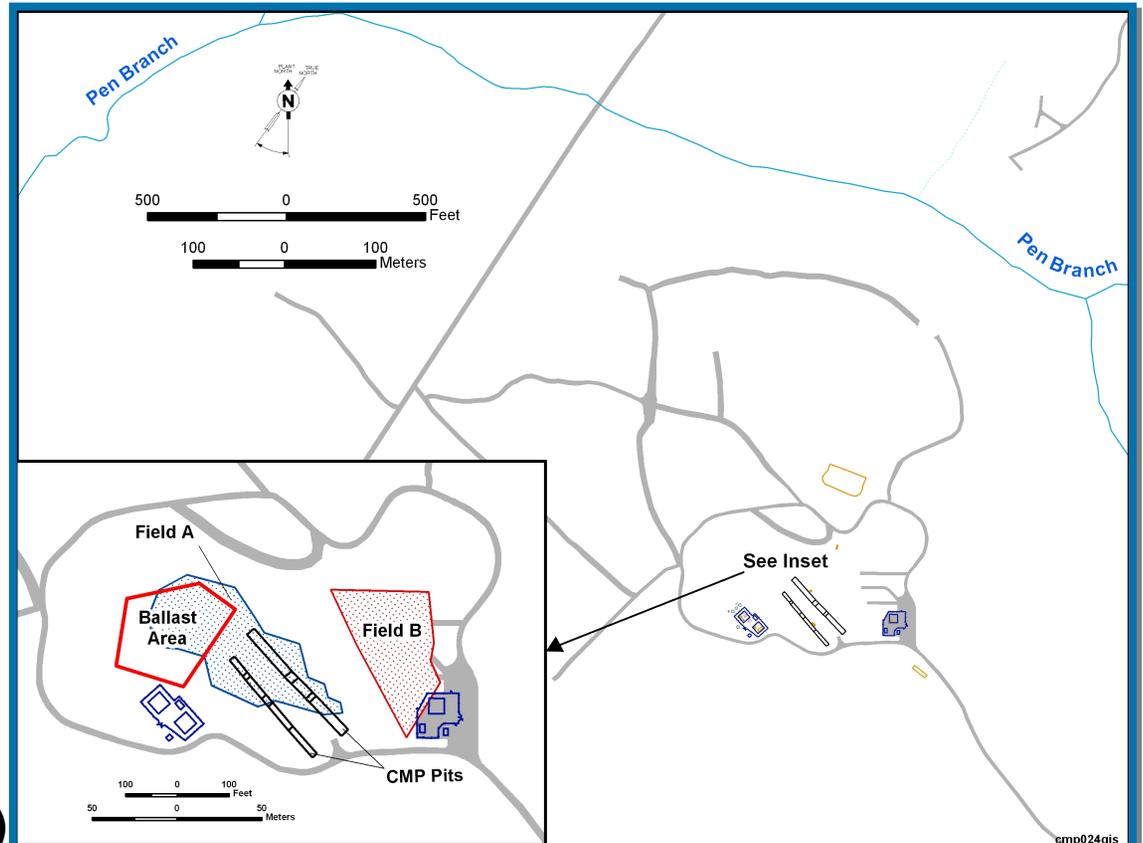
## Location of the CMP Pits

- Located in the central portion of SRS
- Approximately one mile north of L Reactor
- Remote location



## CMP Pits Layout

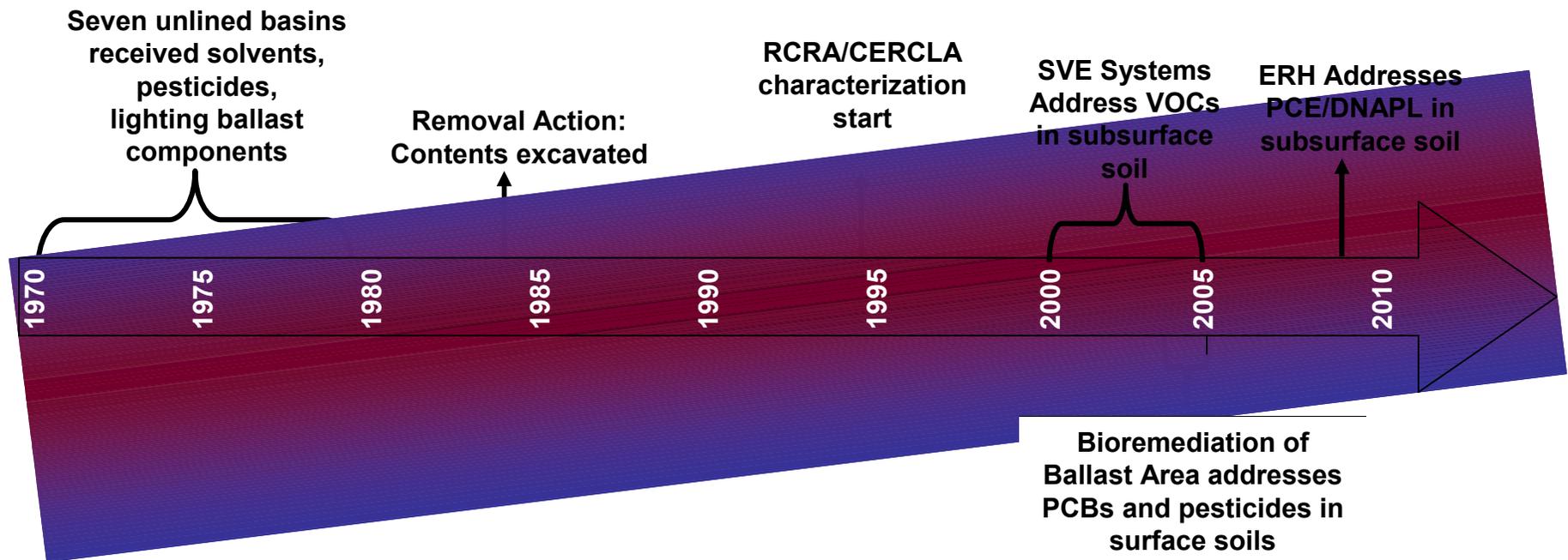
- Located 1500 feet from Pen Branch
- Located on top of knoll; 310 feet msl
- 90 feet in depth to groundwater
- Includes Subunits:
  - Pits soil (1 acre)
  - Ballast Area soil (0.7 acres)
  - Groundwater (50 acres)
  - Surface water



## Primary Contaminants of Concern (COCs)

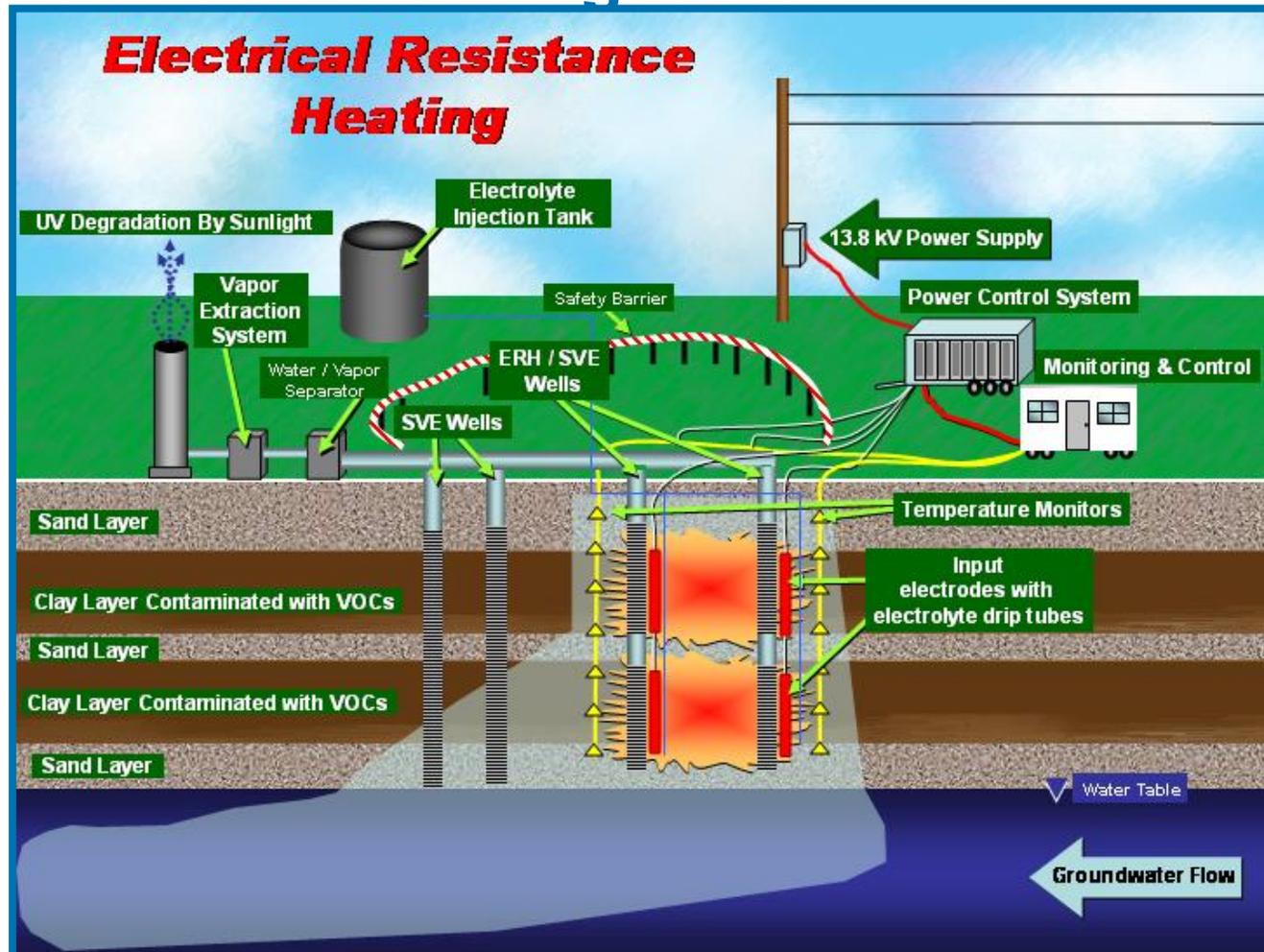
- **Surface Soil – PCBs and Pesticides (Ballast Area)**
- **Subsurface Soil – PCE and DCM (groundwater source term)**
- **Groundwater – VOCs and pesticides**
- **Surface water - none**

# Chronology of Activities at the CMP Pits



# Electrical Resistance Heating for DNAPL Removal

- Voltage was supplied to electrodes
- Current traveled through soil
- Soil heated and contaminants volatilized
- Soil Vapor Extraction (SVE) System extracted contaminants



# CMP Pits ERH / SVE Construction

January  
2007



**Utilized Parts from the C-Area ERH System**

# Permit Compliance

- Industrial Wastewater Treatment Permit: for Condensate Treatment
- Land Application Permit: treated condensate was sprayed to the ground
- Air Quality Control Permit: for Volatile Organic Compound (VOC) stack emissions from two SVE Units (SVEUs)
- Underground Injection Permit: for electrolyte injection



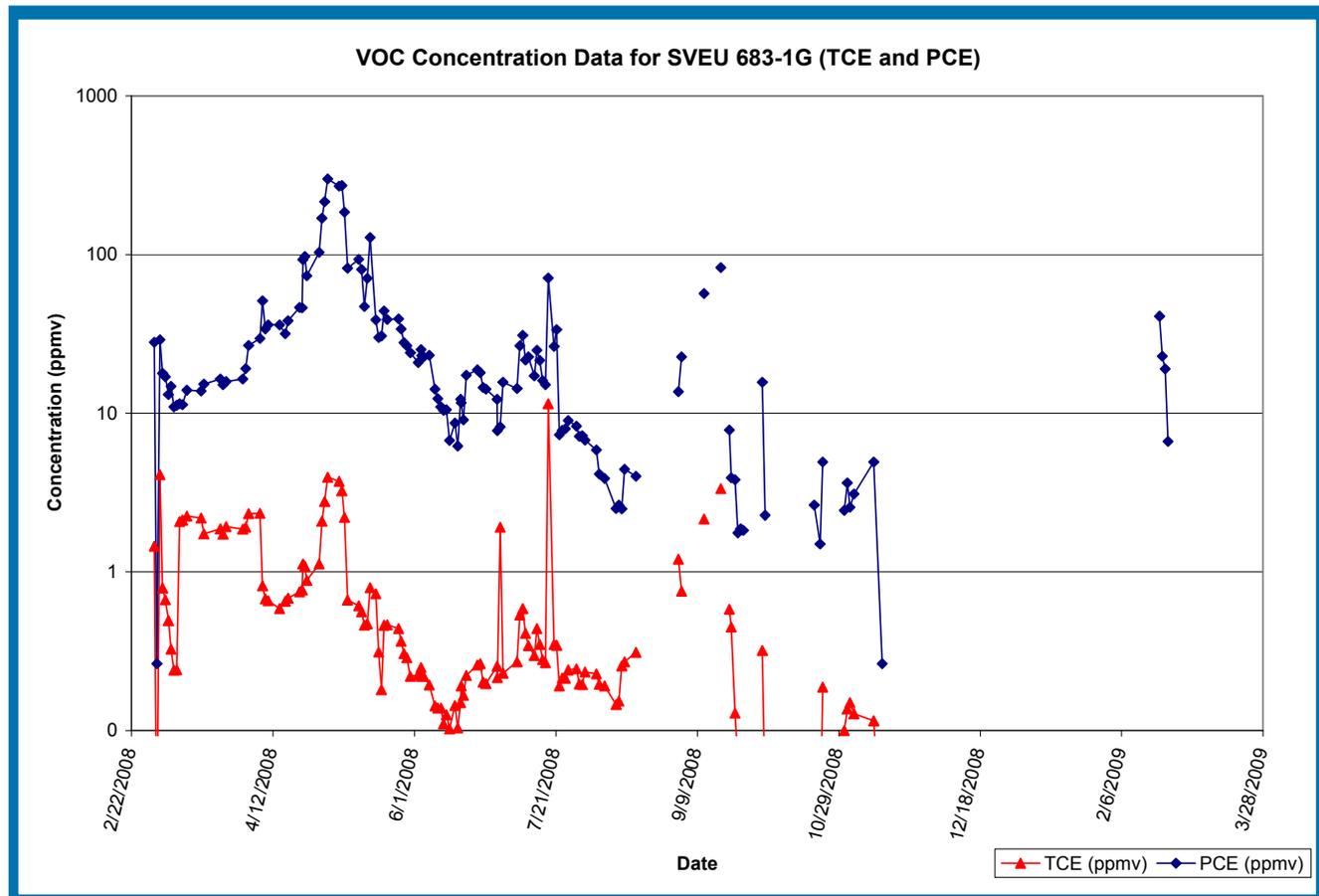
# CMP Pits ERH / SVE Construction Complete

(continued)



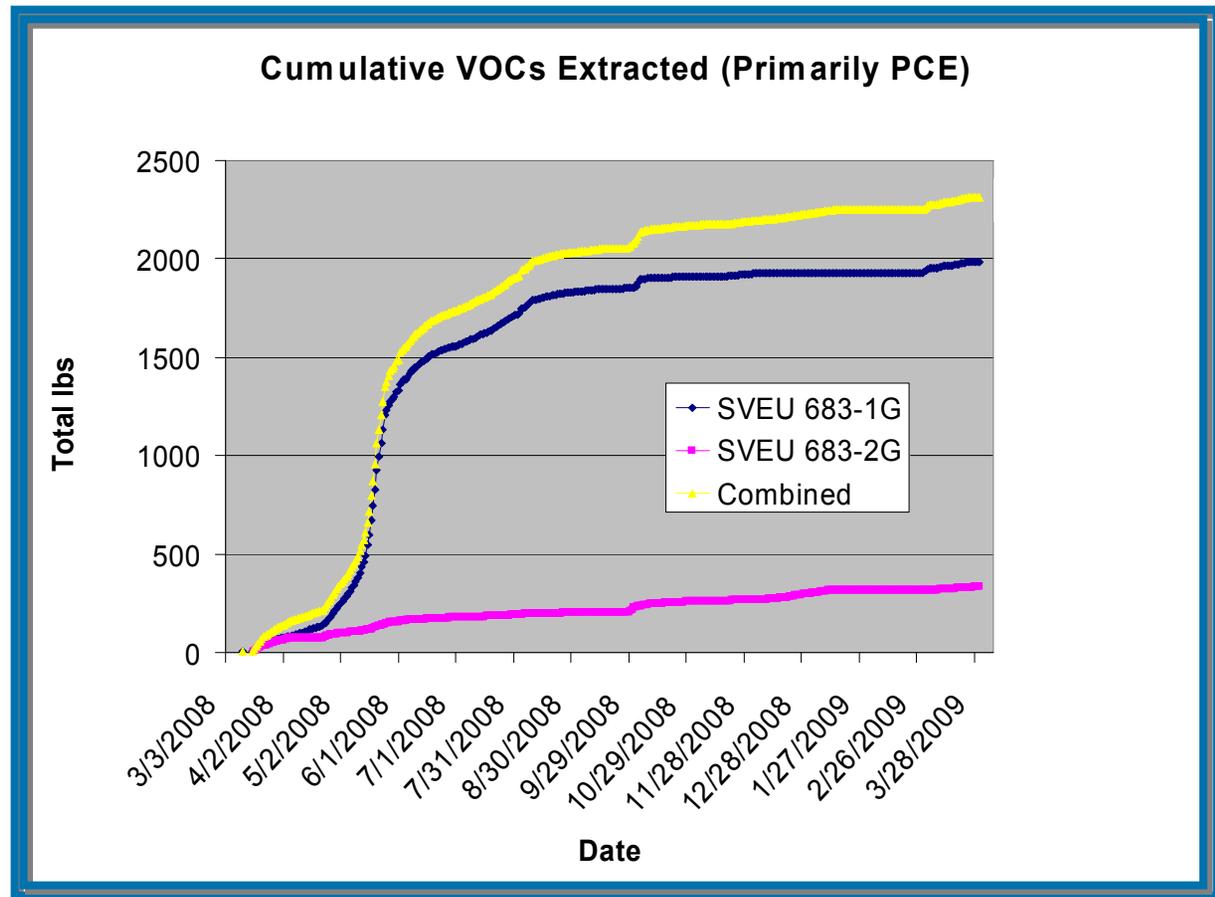
# Performance Monitoring

**VOC**  
Concentrations  
were measured  
from the SVEU  
stack to  
measure  
performance  
during ERH



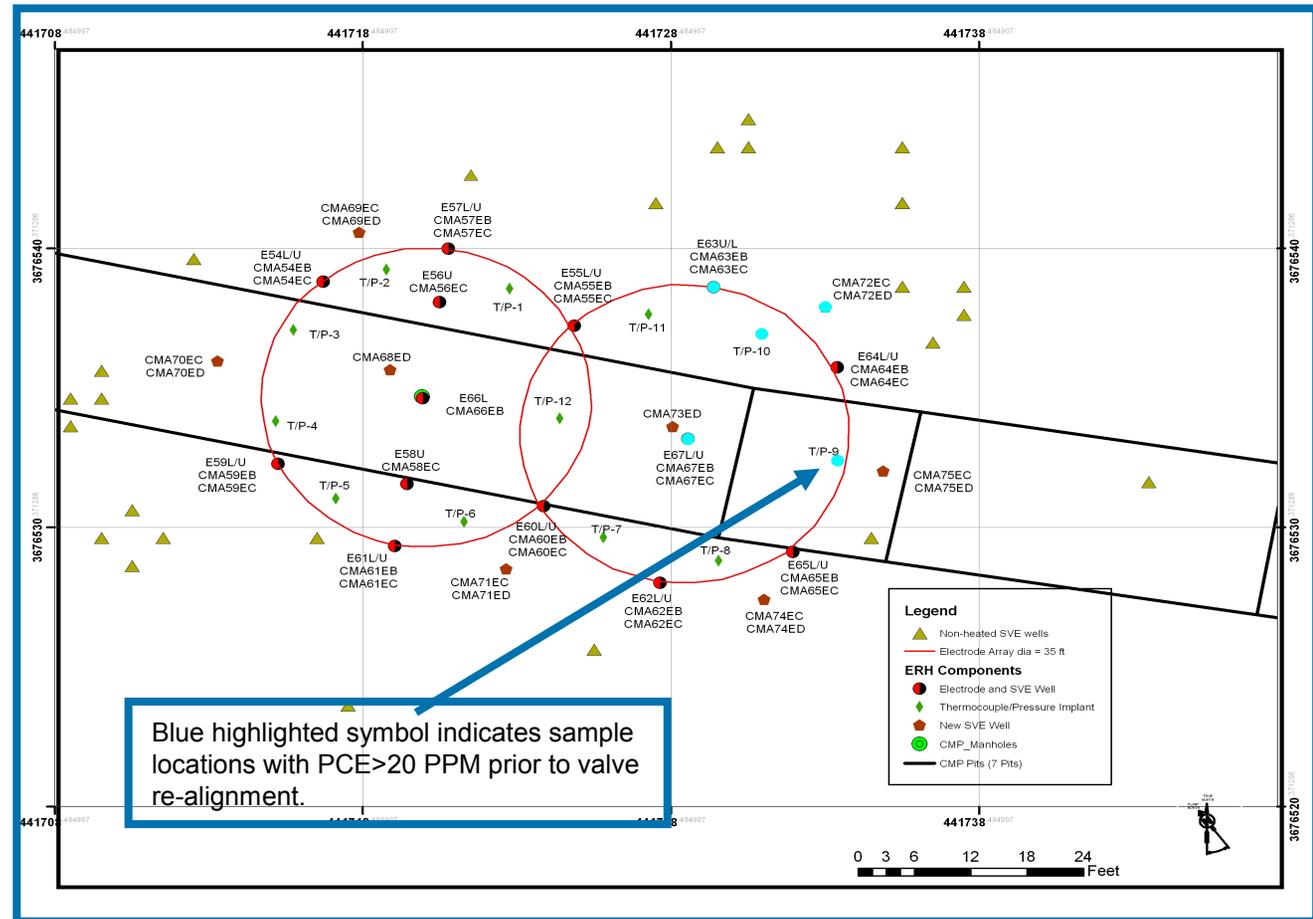
# VOCs Extracted During ERH

**2,300 pounds of  
VOCs were  
extracted during the  
ERH Process**



# Vapor Sampling Prior to SVE Shutdown

All SVE Wells (red shapes) and pressure implants (green diamonds) were sampled to ensure no “pockets” of VOCs remained



# Final Remedial Action

## ERH / SVE Schedule:

- Winter 2007: Construction completed
- March 2008: Operation began

## ERH / SVE Project Duration:

- November 2008: Heating ceased
- March 2009: SVE ceased

## Confirmation Soil Sampling

- December 2009: 65 soil samples taken from three locations (20-70 feet bls)
  - Sampling Plan - agreed to by SCDHEC, EPA and DOE

## **CMP Pits ERH / SVE – A Success**

- **Summary statistics**
  - Remediation conducted safely
  - Initial soil maximum PCE concentration 9,800 mg/kg
  - Remedial goal - 30 mg/kg – as specified in the Record of Decision
  - ERH/SVE extracted 2,300 pounds PCE
  - Confirmation soil maximum PCE concentration (after ERH/SVE) 1.8 mg/kg

**1.8 mg/kg <<< 30 mg/kg**

## What's Next

- **Complete equipment removal by April 2010**
- **Disposition soil on windrows**
- **Effectiveness Monitoring Report due in June 2010**
  - **Soil Results**
  - **MNA Monitoring Results**